

A COMPARATIVE STUDY OF THE METATHORACIC WING IN THE FAMILY LYGAEIDAE

(HEMIPTERA: HETEROPTERA)

JAMES A. SLATER AND HENRY W. HURLBUTT, *Department of Zoology and
Entomology, University of Connecticut, Storrs*

The present study was undertaken in an attempt to ascertain whether or not the venation of the hind wing of members of the family Lygaeidae might possess characters important to a better understanding of the systematic relationships existing within this large and heterogeneous family.

Although the taxonomic importance of wing venation is well established in many orders of insects, the wings have been used only sparingly in the Heteroptera. Recent studies by Leston (1953a and b) in the Pentatomoidea and Usinger (1943) in the Reduvoidea have indicated that the wing has considerable taxonomic value in these groups. There has, to our knowledge, been no systematic attempt to utilize these structures within the family Lygaeidae.

We have not attempted to investigate the tracheation nor the homologies of the wing veins, and have adopted the terminology introduced by Leston (1953a), as modified from Tanaka (1926), as presenting an intelligible system that has the advantage of accounting for all the structural parts present in the lygaeid wing without doing violence to the origin of the various veins. Students more familiar with the system of Hoke (1926) may readily compare the two systems by utilizing the illustrations of the various species discussed in the following pages.

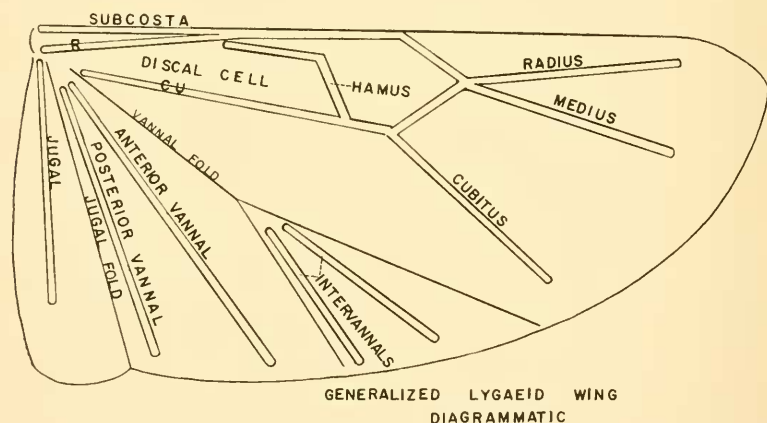
Technique: For purposes of the present study the majority of the wings were studied from dried specimens. A small number of species were studied from living specimens taken in the field. Wing mounts from dried or fresh material were obtained by the following technique. With a dissecting microscope and forceps the wings were removed and placed on a drop of water. Care was taken at this point to unfold the jugal lobe. The wing was then drawn onto the top of a drop of glycerine and a coverslip added for protection. To keep the coverslip from touching the glycerine a drop of fingernail polish was placed under each corner of the coverslip. Venation is most apparent if no glycerine is allowed to cover the upper surface of the wing. Additional glycerine may readily be placed under the wing if the original glycerine supply dries out. In some cases it was necessary to relax the insect in ethyl acetate for several hours before removal of the wing.

Where one is not greatly concerned with the nature of the jugal area, or where comparison only is desired, it is useful to work with dried specimens. With care one may readily remove the front wing and carefully pull the hind wing laterally until the venation is clearly exposed. This method has the advantage of allowing the investigator to check over many species in a relatively short period of time.

Generalized lygaeid wing: (Text figure)

It may safely be said that the lygaeid wing is never of a completely primitive nature within the suborder. However, it is in many species still rather generalized and close to a pentatomoid pattern. The only important specialization uniformly found in the Lygaeidae as contrasted with the Pentatomoidea is the loss of the antevannal vein. The presence of this vein is apparently characteristic of the latter group.

The generalized lygaeid wing may be summarized as follows: 1, Subcosta present and separated from radius in basal wing area; 2, hamus well developed as a complete vein in the discal cell, the anterior portion bent strongly toward the wing base; 3, radius and media fused only at a single point distad of the discal cell; 4, vannal fold bifid for nearly its entire length; 5, antevannal vein absent; 6, intervannals present, short, and not fused at base; 7, vannals separate for nearly entire length (Tanaka notes a single trachea, thus the primitive condition may have been a single vein); 8, jugal vein single and extending throughout most of jugal lobe.



The principal modifications from this generalized scheme are the loss of the hamus, subcosta, and intervannals, fusion of the vannal folds, basal fusion of the vannals, reduction or loss of the second vannal and the jugal, and fusion of radius and media for some distance beyond the discal cell.

Of these modifications two appear to be very important at higher group levels within the family. These are the loss of the hamus and the intervannals. Frequently the reduction of these veins is correlated, although in the Lygaeini (fig. 7) the hamus is well developed while the intervannals are entirely lacking. The presence basally of the subcosta and the reduction of the posterior vannal also are useful modifications at subfamily and tribal levels.

Other modifications must be interpreted with much caution as they generally are the result of vein fusion and appear to have arisen independently in very different groups. This may be illustrated in the case of the radius and the media, which often are fused for some distance beyond the discal cell in some genera of such diverse groups as Cleradini, Blissinae, Cyminae, and Pachygronthinae.

Subfamily **LYGAEINAE**

The most generalized wing condition within the subfamily is found in the genera *Nysius*, *Ortholomus*, and *Rhypodex*, where both hamus and intervannals are present and the intervannals may be either fused basally or separate (figs. 6 and 8). This very generalized condition indicates that this group of genera is near the primitive lygaeid line.

Such orsilline genera as *Belonochilus* and *Orsillus* show a more specialized condition in that the intervannals are absent. It seems probable, upon the basis of this as well as other features, that two well defined groups are present in what we now call the Orsillini.

The Lygaeini resemble the *Orsillus-Belonochilus* group by virtue of the loss of the intervannals. However, this tribe possesses a short distinct basal subcostal vein. This feature is unique within the family (fig. 7).

Species examined: LYGAEINI.—*Lygacus kalmii* Stal, *Melanocoryphus bicrucis* (Say), *Graptostethus servus* (F.), *G. argentatus* (F.), *Caenocoris neri* Germar, *Oncopeltus fasciatus* (Dallas). ORSILLINI.—*Nysius cricae* (Schill.), *N. californicus* Stal, *Ortholomus scolopax* (Say), *Belonochilus numenius* (Say), *Orsillus reyi* Puton, *Rhypodex clavicornis* (F.).

Subfamily **CYMINAE**

It is evident that the present division of this subfamily into two tribes, the Ischnorhynchini and the Cymini, is untenable. As Mr. H. G. Barber will treat the systematic groupings in this subfamily in a forthcoming publication, we will confine ourselves to the observation that the Ischnorhynchini wing is very generalized, whereas in the Cymini and in *Ninus* and its allies the hind wing shows the most specialized condition in the entire family.

In the Ischnorhynchini¹ all species examined have a completely developed hamus and intervannals. *Polychisme* (fig. 1) is perhaps the most generalized by virtue of separate intervannals. In *Kleidocerys* (fig. 3) and *Rhiobia* the intervannals are fused basally and these two genera also have in common a distinctive bend midway along the distal portion of radius. A stridulatory structure is present in some members of this group.

¹The correct usage here is as above, for although the genus *Ischnorhynchus* Fieb. is a junior synonym of *Kleidocerys* Stephens, type genera in synonymy are valid as the stem for family group names under action of the International Commission at the 1953 Copenhagen meetings.

In the Cymini and the "ninines" the hind wings show a very much reduced venation (fig. 4). The hamus and the intervannals are completely lost. Radius and medius are usually fused together for a distance beyond the discal cell. The second vannal is always at least partially reduced.

The Australian genus *Outiscus* (fig. 2) is less reduced in that a hamus remnant is present on the posterior portion of the discal cell.

Species examined: ISCHNORHYNCHINE.—*Kleidocerys resedae* (Panz.), *K. franciscanus* (Stål), *Polychisme hyalinatus* (Spinola), *Rhiobiu chinai* (Esaki), *Ninus insignis* Stål, *Cymoninus flavipes* (Mats.), new genus near *Cymoninus*.

CYMINI.—*Cymus discors* Horvath, *C. angustatus* Stål, *Arphuus coracipennis* Stål, *Outiscus australicus* Stål.

Subfamily BLISSINAE

The wing venation of members of this subfamily is highly specialized. The intervannals are absent, the hamus is either completely absent (fig. 15) or represented by a vestige on the posterior margin of the discal cell (fig. 16). Radius and media are sometimes fused for a distance beyond the discal cell. The jugal and posterior vannals are reduced. The radius reaches the anterior wing margin in *Blissus* as in many myodochines and in the Pamphantinae.

The relationships of the subfamily are obscure and other evidence than the wings is needed to clarify its systematic and phylogenetic position within the family.

Species examined: *Ischuodenus falcis* (Say), *I. subuleti* (Fall.), *Blissus leucopterus* (Say), *Dimorphopterus spinolae* Sign.

Subfamily OXYCARENINAE

This subfamily is unique in the Lygacidae in that the species studied have intervannals present but lack a hamus. Radius and media are fused for some distance beyond the discal cell. The intervannals are separate in *Crophius* (fig. 13), basally fused in *Oxycarenum*. The second vannal and the jugal are somewhat reduced.

It seems likely that the subfamily represents a side branch in its development and not an intermediate stage in a main line of descent. However, it is certainly speculative whether the oxycarenines have arisen from an Artheneinae-like stock or from the Orsillines.

Species examined: *Crophius scabrosus* (Uhler), *Oxycarenum* sp. (S. Africa).

Subfamily GEOCORINAE

The condition of the hind wings in members of this subfamily is most interesting. The wing venation (fig. 10) shows considerable specialization by reason of the loss of intervannals and the loss or reduction of the hamus. However, it is evident that the condition

is less specialized than in such a group as the Cymini for the hamus stub is retained in many species of *Geocoris* (i.e. *pallens* and *bullatus*), *Hypogecoris*, and *Ninyas*. It is, however, absent in *Geocoris uliginosus* Say and *G. flaviceps* Burm. Furthermore, although the intervannals are absent the vannal folds are in most cases separate for most of their length.

The genus *Germalus* has a completely developed hamus and basally fused intervannals. It seems doubtful whether this genus represents a true geocorine (note also the fully developed claval commissure), and the relationship appears to be largely with the henestarine stem.

Species examined: *Geocoris pallens* Stål, *G. bullatus* (Say), *G. uliginosus* (Say), *G. flaviceps* Burm., *Hypogecoris piccus* (Say), *Ninyas deficiens* (Leth.), *Germalus samoanus* China.

Subfamily HETEROGASTIRINAE

This well defined subfamily possesses a unique feature in that the hamus, as discussed above, has migrated distally so that it reaches the posterior portion of the discal cell distad of the point where cubitus diverges from the discal cell as a free vein. This condition frequently creates a triangular cell in the anterior portion of the wing formed by the hamus, media, radius, and the point of fusion of radius and media (figs. 12 and 14).

The intervannals are present and either separate (*Heterogaster*, *Dinomachus*, *Hyginus*) or basally fused (*Tamasanka*, *Platyplax*).

It is evident that in general the wing is generalized with an independent specialization of the hamus.

The genus *Artemidorus* (fig. 12) has in the past been the subject of much debate as to its systematic position. Distant, Bergroth, and Horvath all have discussed the relationships. The hind wing indicates that the continental workers are correct in considering the genus as a heterogastrine. The wing though specialized by the loss of the intervannals nevertheless possesses the hamus in the same characteristic position as do the other members of the subfamily.

Species examined: *Heterogaster urticae* (F.), *Dinomachus marshalli* Dist., *Tamasanka limbata* Dist., *Platyplax salviae* (Schill.), *Hyginus* sp. (S. Africa), *Artemidorus pressus* Dist.

Subfamily PACHYGRONTHINAE

The hind wing is generalized. Both hamus and intervannals are present and fully developed.

In all members of the tribe Pachygronthini investigated the intervannals are free throughout, whereas in all Teraerini (fig. 9) they are fused at the base. It appears that this distinction may well supplement other characters as a tribal character in the subfamily.

As noted above we consider this subfamily to represent the generalized condition from which the Heterogastrinae have evolved.

Species examined: PACHYGRONTHINI—*Ocdancala dorsalis* (Say), *Pachygrontha bipunctata* Stål, *P. ocdancalodes* Stål, *P. saileri* Slater; TERAERINI—*Teraerius namaquensis* Stål, *Phleggyas abbreviatus* (Uhl.).

Opisthopterus pallidus (Hesse), *Stenophyella maereta* Horv.

Subfamily **HENESTARINAE**

The hind wing of this subfamily is rather generalized (fig. 27). However, there are subtle evidences of reduction present in the reduced hamus and jugal and the basal fusion of the intervannals. It is apparent that this group and *Germalus* are closely allied; indeed the latter may well prove to be a henestarine. The highly specialized geocorines may have developed from a stock very similar to that represented by this small subfamily. Species examined: *Henestaris laticeps* (Curt.)

Subfamily **ARTHENINAE**

The wing is somewhat generalized in that hamus and intervannals are present. However, evidences of specialization are the partial reduction of the hamus, basal fusion of the intervannals, and reduction of the posterior vannal (fig. 26).

In some respects this subfamily appears to represent an intermediate stage between the generalized Ischnorhynchini and the highly modified Cymini. Here again supporting evidence is needed to ascertain whether this is more than a superficial resemblance.

Species examined: *Chilacis typhae* Perr., *Arthenis foreolata* Spin.

Subfamily **CHAULIOPINAE**

The systematic position of this peculiar subfamily is not substantially clarified by the condition of the hind wings. A degree of specialization is evidenced by the loss of the intervannals and the fusion of the vannal fold (fig. 24). The hamus is present although apparently not completely developed.

There is some habitus resemblance between this group and the Maleinae, and the venation of the latter could well represent a specialization from that of the Chauliopinæ. Again supporting evidence is needed. There is no evidence to support a Heterogastrine relationship as intimated by some authors. Indeed the characteristic nature of the hamus in that subfamily would seem to rule out the inclusion of this group as even representing a closely related group.

Species examined: *Chauliops fallax* Scott.

Subfamily **MALCINAE**

The hind wing is highly specialized with loss of hamus and intervannals, fusion of the vannal fold, and reduction of the vannal veins (fig. 5).

The venation is almost exactly as in the Cymini and represents with this latter group the most strongly reduced situation found in the entire family. Whether these taxa are closely related or we are dealing with parallelism must await additional evidence. Our feeling is that probably parallel development has occurred.

Species examined: *Malcus flavidipes* Stål.

Subfamily **PAMPHANTINAE**

The affinities of this peculiar subfamily are obscure. The venation is specialized (fig. 23) with loss of hamus and intervannals and partial fusion of the vannal folds. Radius curves forward to reach the leading edge of the wing in the distal area as in many myodochines. It may well be that these ant-mimics represent extremely specialized myodochine forms whose subfamily identity is masked by the fusion of the basal abdominal sternites. The nature of the wing in *Blissus* is also much as in this subfamily.

The relationship of the Pamphantinae to the Mediterranean subfamily Bledionotinae should be investigated. Unfortunately representatives of the latter subfamily have not been made available for study.

Species examined: *Pamphantus elegantulus* Stål.

Subfamily **MEGALONOTINAE**

The hind wing has proven somewhat disappointing as a diagnostic character for subgroups within this large and varied subfamily. There is little to observe in the hind wings that will separate the genera into the traditional tribal units. This is chiefly due to the generalized wing venation found in most species. It seems obvious for many reasons that this subfamily has diverged from the remaining lygaeid subfamilies at an early period and that such specializations as do occur in the hind wings are independent variations of the main megalonotine line.

Tribe—MYODOCHINI:

In many genera of this tribe radius beyond the discal cell curves forward to reach the leading edge of the wing (fig. 18). This occurs so frequently as to be a useful although not infallible diagnostic feature. Radius reaches the anterior wing margin in the following genera: *Myodocha*, *Heracus*, *Pachybrachius*, *Ligyrocoris*, *Paromius*, *Zeridoneus* and *Prosomaecus*. In *Exptochiomera*, *Ptochiomera*, *Kolenetrus*, and *Cnemodus*, radius curves strongly forward but does not reach the wing margin.

Many myodochines also have a rather characteristic vannal condition where the two vannals are completely fused on the basal half and then curve strongly apart to assume a rather "wishbone" like appearance (fig. 18). This condition, however, is also found in some other genera within the subfamily.

In *Prosomaecus* the intervannals are absent; otherwise they are present and usually separated.

Species examined: *Myodocha serripes* (Oliv.), *Heracus plebejus* Stål, *Pachybrachius basalis* (Dallas), *Ligyrocoris diffusus* Uhler, *Exptochiomera* sp., *Paromius longulus* (Dallas), *Ptochiomera nodosa* Say, *Kolenetrus plenus* (Dist.), *Cnemodus mavortius* (Say), *Zeridoneus costalis* (V.D.), *Prosomaecus brunneus* Scott.

Tribe MEGALONOTINI:

The venation is usually of a generalized nature (fig. 17). However, in *Megalonotus* (fig. 21) the radius is vestigial beyond the discal cell. *Ozophora* (fig. 25) is highly specialized in lacking both hamus and intervannals. This is the greatest degree of vein reduction found in the entire subfamily.

Species examined: *Peritrcchus fraternus* Uhl., *Megalonotus chiragurus* var. *californicus* (V.D.), *Ozophora picturata* Uhl., *Lamprodema maurum* (F.), *Neocattarus* sp.

Tribe BEOSINI:

Wing venation of generalized nature. In *Sphragisticus* the intervannals are separate; in *Rhyparochromus* (fig. 28) and *Dieuches* (fig. 20) they are fused basally.

Species examined: *Sphragisticus nebulosus* (Fall.), *Rhyparochromus umbrosus* (Dist.), *Dieuches* near *placidus* (Stal).

Tribe LETHAEINI:

The wing venation as in most other Megalonotinae is generalized in nature. The intervannals are fused in *Eremocoris* (fig. 22) and *Paragonatus*, and separate throughout in the other genera studied. In *Scolopostethus* the intervannals appear rather obsolete.

In *Eremocoris* there are peculiar veinlike stubs present on cubitus and media midway along their length in the distal portion of the wing. The vein stub of cubitus may conceivably represent the remnant of the antevannal vein so characteristic of the Pentatomoidea.

Species examined: *Cryphula parallelogramma* Stål, *Drymus unus* (Say), *Eremocoris ferus* (Say), *Lethacus cribratissimus* Dohrn, *Paragonatus divergens* (Dist.), *Scolopostethus thomsoni* Reut., *Gastrodes grossipes* (D.G.) *Rhaptus quadricollis* (Spin.).

Tribe GONIANOTINI:

The species investigated in this tribe, *Emblethis vicarius* Horvath, shows a completely generalized wing pattern throughout (fig. 19).

Tribe CLERADINI:

The venation of this tribe (fig. 11) is rather specialized in lacking intervannals, having the vannal folds fused for a considerable distance and in having radius and media fused for a short distance beyond the discal cell. From this as well as other features it is evident that the tribe is a rather specialized unit within the subfamily. Species examined: *Clerada apicicornis* Sign.

Phylogenetic Considerations.—The generalized lygaeid wing, as discussed above, is retained in several tribes and subfamilies. We find a typical condition in many Megalonotinae, Ischnorhynchini, Orsillini, and Pachygronthinae. The first modification to appear is the basal fusion of the inter-intervannals, both free and basally fused intervannals being found in all of the above groups and sometimes within the same genus (i.e. *Nysius*).

The next important modification after intervannal fusion is loss of the intervannals. This is frequently concurrent with reduction and subsequent loss of the hamus. However in the Lygaeini, Chauliopininae, Cleradini, and *Prosomachus* of the Myodochini, the intervannals are absent whereas the hamus is completely developed. The Lygaeini are also unique in retaining the basal portion of the subcosta. In the Oxycareninae exactly the reverse situation is found, for here the intervannals are present whereas the hamus is lost. In all other cases, however, where the intervannals are absent the hamus is also either absent, or reduced to a short stub on the posterior portion of the discal cell.

In the otherwise generalized Heterogastrinae the hamus has migrated toward the apex of the wing so that its posterior connection with the discal cell lies distad of the separation of cubitus from the discal cell (figs. 12 and 14).

The most specialized condition of the wings within the family is found in the Cymini (together with the genera related to *Ninus*) and the Maleinae. Here both intervannals and hamus are lost and the posterior vannal and jugal veins are reduced or absent.

Our conclusions are that lines of descent within the family cannot be determined by the venation of the hind wings alone. However, the following discussion is an attempt to indicate probable trends and we hope it will be further elaborated in the near future by a study to integrate the information from various sources into a reconstruction of the phylogeny of the family.

Using primarily the wing veins, but supplementing at times with additional characters, we present the following situation.

Five main lines of descent which we will call the Pachygronthine line, the Orsilline line, the Geoeorine line, the Ischnorhynchine line, and the Megalonotine line.

Pachygronthine line.—The situation here is quite simple. We have first the completely generalized tribe Pachygronthini. The Teraerini are obviously closely related, the only basic difference being the basal fusion of the intervannals. From the generalized form the Heterogastrinae arise through *Heterogaster*, *Dinomachus*, and *Hyginus* to the slightly more specialized condition of *Tamasanka* and *Platyplax*. The most highly specialized condition of this line is in *Artemidorus* with the absence of intervannals and the distal shift of the hamus beyond the cubital origin on the discal cell.

Orsilline line.—Generalized venation in this line is shown by such genera as *Nysius*, *Ortholomus*, and *Rhpodes*. From this condition develop the more specialized orsillines where the intervannals are absent (i.e. *Belonochilus*, *Orsillus*). The Lygaeini by virtue of retention of the subcosta and loss of the intervannals present an anomalous condition. It is difficult to interpret this condition until more study has been made of the relationships of the tribal units within the subfamily.

Geocorine line.—A completely generalized form has not been found for this group. However the genus *Germalus* is generalized in all but the basal fusion of the intervannals and may be considered as representative of the generalized type (this is not to state that *Germalus* itself is necessarily primitive). From this condition a slight advance is evident to the Henestariinae where the hamus is reduced; there is basal fusion of the intervannals and the vannal fold is fused for a considerable distance. It may well be that the Blissinae are an offshoot from a similar ancestor. The main line of descent however is to the Geocorinae through subsequent stages of reduction and ultimate loss of the hamus and the loss of the intervannals.

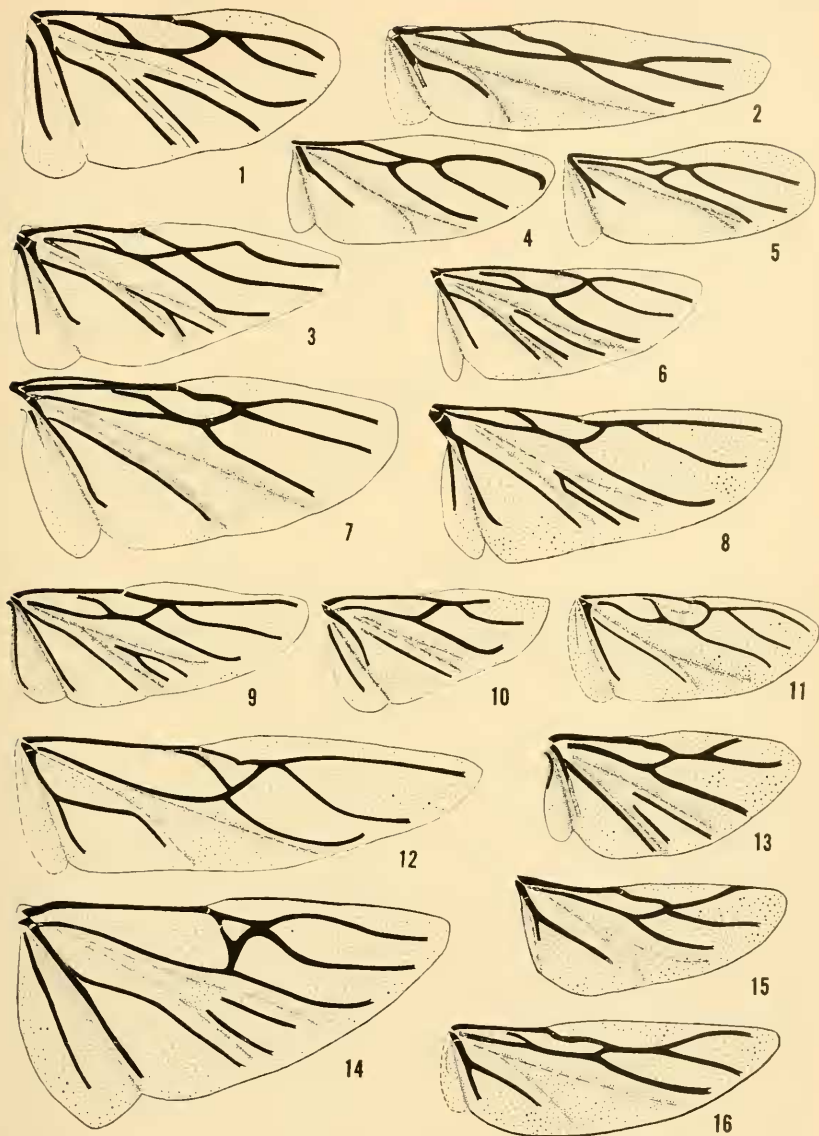
Ischnorhynchine line.—This complex presents an interesting and complex situation, with the genera *Kleidocerys*, *Rhiobia*, and *Polychisus* illustrating generalized conditions. It seems possible that by independent loss of the hamus the Oxycareninae have diverged from this line. The main trend within the group is often indicated by a tendency toward loss of the posterior vannal. We find in the Artheneinae a partial reduction of the hamus, basal fusion of the intervannals, and partial posterior vannal reduction. It seems feasible to consider this as the next evolutionary step from the generalized Ischnorhynchini. It is possible that the line now diverged into two groups, one to the Chauliopinae and to the Maleinae, the other through such cymine genera as *Outiscus* to the highly specialized Cymini and the "ninine" genera.

Megalonotine line.—This line has obviously diverged from the remainder of the Lygaeidae at a very early stage in their evolution. In general the whole group is generalized. The myodochines seem to show a slight specialization by virtue of the strong anterior curvature of radius in the distal portion of the wing. The genus *Ozophora* is also highly specialized. It is possible that the specialized Pamphantiinae may well have arisen from a myodochine ancestry.

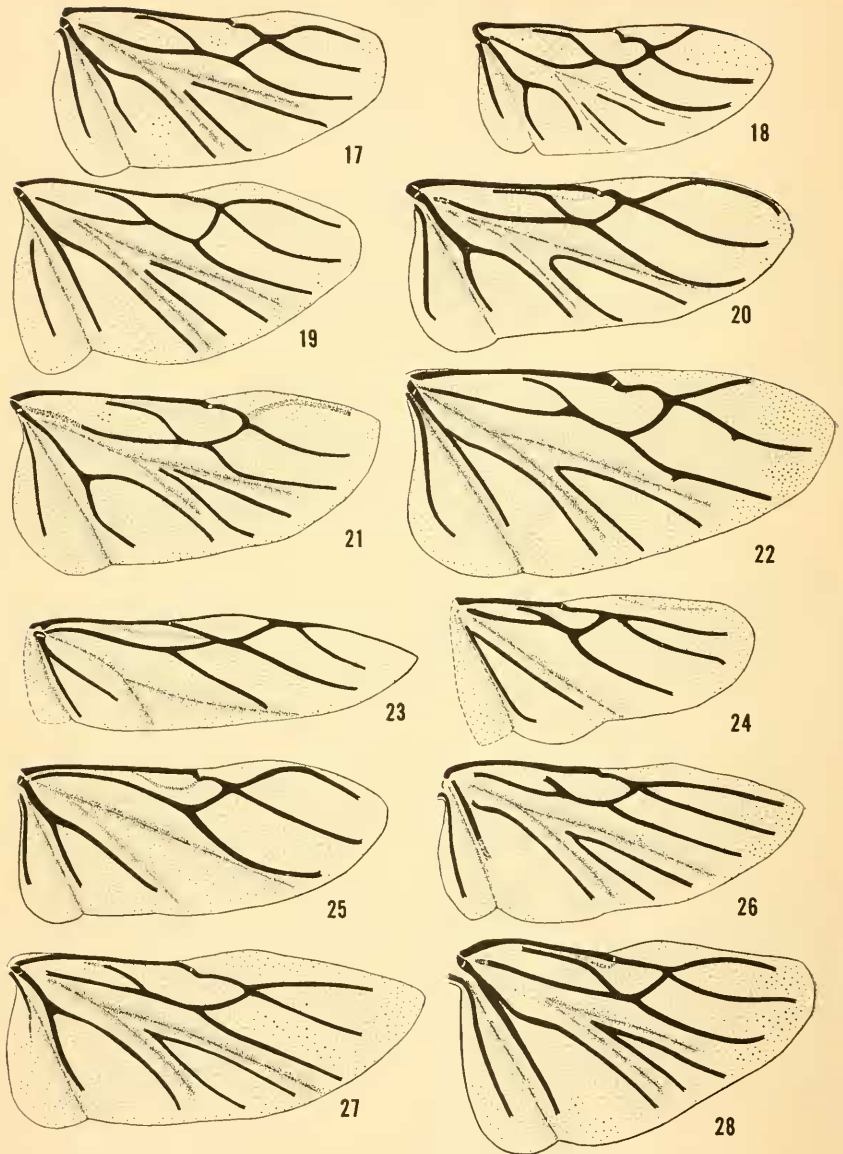
Obviously there are a number of highly speculative interpretations in the above discussion. We propose to analyse interrelations within the family more fully in a later paper.

ACKNOWLEDGEMENTS

We should like to extend our sincere thanks to Dr. Norman T. Davis and Mr. P. D. Ashlock, of the Department of Zoology and Entomology of the University of Connecticut, for aid given during the course of this study.



Metathoracic wings of Lygaeidae.—Fig. 1,—*Polychisme hyalinatus* (Spinola); fig. 2, *Ontiscus australicus* Stål; fig. 3, *Kleidocerys resedae* (Panz.) fig. 4, *Cymus discors* Horv.; fig. 5, *Malcus flavidipes* Stål; fig. 6, *Nysius ericae* (Schill.); fig. 7, *Lygaeus kalmii* Stal; fig. 8, *Nysius californicus* Stal. fig. 9, *Teracrius namaquensis* Stål; fig. 10, *Geocoris uliginosus* (Say); fig. 11, *Clerada apicicornis* Sign.; fig. 12, *Artemidorus pressus* Dist.; fig. 13, *Crophius scabrosus* (Uhl.); fig. 14, *Heterogaster urticae* (F.); fig. 15, *Blissus leucopterus* (Say); fig. 16, *Ischnodemus faticus* (Say).



Metathoracic wings of Lygaeidae.—Fig. 17, *Peritrechus fraternus* Uhl.; fig. 18, *Pachybrachius basalis* (Dall.); fig. 19, *Emblethis vicarius* Horv.; fig. 20, *Dieuches* nr. *placidus* Stål.; fig. 21, *Megalonotus chiragraus* var. *californicus* (V.D.); fig. 22, *Eremocoris fesus* (Say); fig. 23, *Pamphantus elegantulus* Stål.; fig. 24, *Chauliops fallax* Scott; fig. 25, *Ozophora picturata* Uhl.; fig. 26, *Chilacis typhae* Perr.; fig. 27, *Henestaris laticeps* (Curt.); fig. 28, *Rhyparochromus umbrus* (Dist.).

REFERENCES

- Hoke, S. 1926. Preliminary paper on the wing-venation of the Hemiptera (Heteroptera). Ann. Ent. Soc. Amer. 19: 13-34.
- Leston, D. 1953a. Notes on the Ethiopian Pentatomoidea (Hemiptera): XVI. An acanthosomid from Angola, with remarks upon the status and morphology of Acanthosomidae Stål. Publ. Cult. Comp. Diam. Angola No. 16, pp. 121-132.
- , 1953b. "Phloeidae" Dallas: Systematics and morphology with remarks on the phylogeny of "Pentatomoidea" Leach and upon the position of "Serbaana" Distant (Hemiptera). Rev. Brasil Biol. 13 (2):121-140.
- Tanaka, T. 1926. Homologies of the wing veins of the Hemiptera. Annot. Zool. Jap. 11:33-54.
- Usinger, R. L. 1943. A revised classification of the Redurioidea with a new subfamily from South America (Hemiptera). Ann. Ent. Soc. Amer. 36:602-618.

THE SPIDER, CONOPISTHA TRIGONA HENTZ, FAMILY THERIDIIDAE, AS A COMMENSAL OF ALLEPIERA LEMNISCATA WALCKENAER, FAMILY ARGIOPIDAE, IN PRINCE GEORGES COUNTY, MARYLAND

In the literature *Conopistha trigona* is recorded as a commensal spider. Muma (1945, Md. Agr. Expt. Sta. Bull. A-38) reported that this species is found most frequently in the webs of *Metepeira labyrinthica* Hentz. Comstock (1948, The Spider Book) stated that it lives as a commensal, feeding on the smaller insects caught in the web but neglected by its host.

During the course of regular observations on a basilica spider, *Allepiera lemniscata*, at Greenbelt, Md., from May to July 6, and from August 26 through October 1956, I observed *Conopistha trigona* as a frequent commensal of this basilica spider on June 20, 21, and 25; on August 30; and on September 23 and 25. On the last 5 days the commensal was in the dorsal or ventral labyrinth strands of the basilica spider's web. On four occasions, the host was present in the web with the commensal, and on two other occasions the commensal was in a deserted web of the basilica spider. On August 30 the commensal was feeding beside its own cocoon, which it had fastened to a strand of the dorsal labyrinth of the web of its host. The latter was present in its normal waiting position under the center of the snare.

On June 20 I recorded one specimen of *Conopistha trigona* under the center of the snare of a young basilica spider in the position normally occupied by the host. The basilica spider was above and near the perimeter of the snare on one of the strands of the dorsal labyrinth facing the intruding spider, which was the larger of the two.—DONALD LAMORE, 2C Gardenway, Greenbelt, Md.